SUSQUEHANNA RIVER BASIN

WEST BRANCH OF LACKAWANNA RIVER, SUSQUEHANNA COUNTY

PENNSYLVANIA

ROMOBE LAKE DAM

NDI No. PA 00051

PennDER No. 58-10

Dam Owner: Mr. Michael Puskas

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

prepared for

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers

4301 Dutch Ridge Road

Beaver, Pennsylvania 15009

April 1981

SUSQUEHANNA RIVER BASIN

ROMOBE LAKE DAM
SUSQUEHANNA COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI No. PA 00051
PennDER No. 58-10

(6) PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM.

Romobe Lake Dam (NDI Number PA-00051 PennDER Number-58-10). Susquehanna River Basin. West Branch of Lackawanna River, Susquehanna County, Pennsylvania. Phase I Inspection Report.

Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

(11) Apr 81

Prepared by: MICHAEL BAKER, JR., INC.
Consulting Engineers
4301 Dutch Ridge Road
Beaver, Pennsylvania 15009

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PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Romobe Lake Dam, Susquehanna County, Pennsylvania
NDI No. PA 00051, PennDER No. 58-10
West Branch of Lackawanna River
Inspected 1 November 1980

ASSESSMENT OF GENERAL CONDITIONS

Romobe Lake Dam is owned by Mr. Michael Puskas and is classified as a "Significant" hazard - "Small" size dam. The dam was found to be in poor overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will not pass the 100-year flood without overtopping the dam. A spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF) is required for Romobe Lake Dam. Because the dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF. During the 100-year flood, the dam is overtopped by a maximum depth of 2.0 feet for a total duration of 40.3 hours. The spillway is therefore considered "Inadequate." It is recommended that the owner immediately develop recommendations for remedial measures to reduce the overtopping potential of the dam.

Several items of remedial work should be immediately initiated by the owner. Item 1 below should be completed under the guidance of a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

1) Develop remedial measures to ensure that the dam is not overtopped by the 100-year flood.

2) Remove the debris and silt at the entrance to the spillway.

3) Repair the dam where overtopping has occurred.

4) Cut the brush on the dam.

5) Cut the brush in the spillway discharge channel.

6) Clear the debris and cut the brush in the channel immediately downstream of the dam.

7) Provide means to draw down the reservoir during an emergency.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

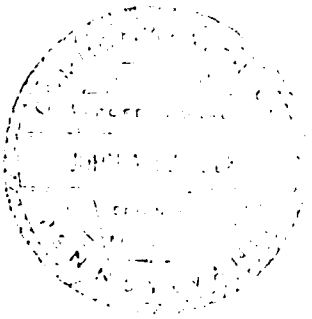
2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. A plan for emergency drawdown of the reservoir should be developed in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

MICHAEL BAKER, JR., INC.



John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 24 April 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 11 May 81

ROMOBE LAKE DAM

Overall View of Upstream Face of Dam (Looking Downstream)

Overall View of Downstream Face of Dam from Left Abutment

TABLE OF CONTENTS

APPENDICES

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ROMOBE LAKE DAM
NDI No. PA 00051, PennDER No. 58-10

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances - Romobe Lake Dam is a dry masonry dam with a height of 8 feet and a crest length of 74 feet. The embankment has a crest width of 2.5 feet and an upstream side slope ranging from 6H:1V (Horizontal to Vertical) to 3H:1V. The downstream face of the dam was originally an 8-foot high vertical masonry wall. This wall was strengthened in 1919 or 1920 by dumping stones over the downstream wall to form a stone embankment. The stones have settled and the downstream embankment now drops 1.5 feet from the crest before the rock fill forms a stone embankment with a slope of 2.4H:1V. The dam has a minimum crest elevation of 1970.0 feet Mean Sea Level (ft. M.S.L.).

The spillway is a grass-lined trapezoidal channel located on the left abutment. It has a bottom width of approximately one foot, a maximum top width of five feet, and a maximum depth of approximately 1.5 feet. The channel entrance has a crest elevation of 1969.1 ft. M.S.L. The spillway has a slope of 5%. The discharge channel has a moderate slope and is well vegetated.

A 12-inch cast iron pipe (CIP) was originally laid through the dam to provide an outlet to drain the reservoir. A valve located on the upstream side of the wall was to be operated with a long handled

valve key. Stones used to strengthen the dam block the pipe
outlet, and sediment has probably covered the inlet works.
There was no evidence of this facility during the field inspection.

b. Location - Romobe Lake Dam is located on the West Branch of the Lackawanna River, approximately 1.4 miles south-southeast of Ararat, Pennsylvania. The structure is located in Ararat Township, Susquehanna County, Pennsylvania. The coordinates for the dam are N 41° 48.6' and W 75° 30.9'. The dam and reservoir are shown on USGS 7.5 minute topographic quadrangle, Thompson, Pennsylvania.

c. Size Classification - The height of the dam is 8 feet. The reservoir volume to the top of the dam, elevation 1970.0 ft. M.S.L., is 195 acre-feet. Therefore, the dam is in the "Small" size category.

d. Hazard Classification - Hathaway Pond Dam is located 3000 feet downstream of Romobe Lake Dam. Hathaway Pond Dam is in the "Significant" hazard category. There are no areas between Romobe Lake and Hathaway Pond Dam which are likely to be damaged in the event of dam failure. However, a damage center of two houses, a trailer and road, located 1800 feet downstream of Hathaway Pond Dam, would be affected if Romobe Lake Dam were to fail. These structures range from less than 5 feet above the streambed to approximately 10 feet above the streambed. Therefore, Romobe Lake Dam is considered to be in the "Significant" hazard category.

e. Ownership - The dam and reservoir are owned by Michael Puskas, 420 Lackawana Drive, Olyphant, Pennsylvania.

f. Purpose of the Dam - The reservoir is used for recreational purposes.

g. Design and Construction History - The original design, date of construction and the builder of the dam are unknown. The first record of the dam is an information survey report dated 1914. Around 1920, stones were placed against the vertical downstream face to increase the stability of the dam, as directed by the Water Supply Commission in 1919.

h. Normal Operating Procedures - There is no formal operating procedure for the dam. The water level is normally maintained at or near the spillway crest, elevation 1969.1 ft. M.S.L.

1.3 PERTINENT DATA

a. Drainage Area (square miles) -	0.98
b. Discharge at Dam Site (c.f.s.) -	
Maximum Flood	Unknown
Spillway Capacity at Maximum Pool (El. 1970.0 ft. M.S.L.) -	5
c. Elevation* (feet above Mean Sea Level [ft. M.S.L.]) -	
Design Top of Dam -	Unknown
Minimum Top of Dam -	1970.0
Maximum Design Pool -	Unknown
Spillway Crest -	1969.1
Streambed at Toe of Dam	1962.3
Maximum Tailwater of Record -	Unknown
d. Reservoir (feet) -	
Length of Maximum Pool (El. 1970.0 ft. M.S.L.) -	3050
Length of Normal Pool (El. 1969.1 ft. M.S.L.) -	2800
e. Storage (acre-feet) -	
Top of Dam (El. 1970.0 ft. M.S.L.) -	195
Normal Pool (El. 1969.1 ft. M.S.L.) -	162
f. Reservoir Surface (acres) -	
Top of Dam (El. 1970.0 ft. M.S.L.) -	36.9
Normal Pool (El. 1969.1 ft. M.S.L.) -	35.6
g. Dam -	
Type - Dry masonry	
Total Length Not Including Spillway (feet) -	74
Height (feet) - Design -	Unknown
Field -	8
Top Width (feet) -	2.5
Side Slopes - Upstream -	6H:1V to 3H:1V
Downstream -	2.4H:1V
Zoning -	None
Impervious Core -	None
Cut-off -	None
Drains -	None

*All elevations are referenced to the minimum crest of the dam, El. 1970.0 ft. M.S.L., as estimated from the USGS 7.5 minute topographic quadrangle, Thompson, Pennsylvania.

h. Diversion and Regulating Tunnels - None

i. Spillway -

Type - Grass-lined trapezoidal channel	
Location - Left abutment	
Bottom Width (feet) -	1
Top Width (feet) -	5
Crest Elevation (ft. M.S.L.) -	1969.1
Gates -	None
Downstream Channel - Well vegetated with moderate slope	

j. Outlet Works - None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Information reviewed for the preparation of this report consisted of File No. 58-10 of the Pennsylvania Department of Environmental Resources (PennDER). This included:

1) An inspection report, dated 29 May 1919, requiring some alterations to the dam because of an inadequate spillway; various correspondence about the alterations; and photos taken before and after these alterations.

2) Post construction inspection reports, the latest dated 17 August 1965, filed by PennDER, Division of Dams and Encroachments. No serious problems were reported and the dam was found to be in good condition.

2.2 CONSTRUCTION

The original design, the builder and the exact date of construction are unknown. Around 1920, stones were placed against the vertical downstream face to increase the stability of the dam. No "as built" or other plans were available for review.

2.3 OPERATION

No formal records are available for operation of the dam and reservoir. The reservoir is typically maintained at the spillway crest elevation (1969.1 ft. M.S.L.) and does not fluctuate much from this level.

2.4 EVALUATION

a. Availability - The information used is readily available from PennDER's File No. 58-10.

b. Adequacy - The information available combined with the visual inspection measurements and observations is adequate for a Phase I Inspection of this dam.

c. Validity - There is no indication at the present time to doubt the validity of the available information.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General - The dam was found to be in poor overall condition at the time of inspection on 1 November 1980. No unusual weather conditions were experienced during the inspection. Noteworthy deficiencies observed during the visual inspection are described briefly, in the following paragraphs. The complete visual inspection checklist, field sketch, top of dam profile, and typical cross-section are given in Appendix A.

b. Dam - The dam shows evidence of having been overtopped. A comparison of the dam with photographs from a 1965 inspection indicates this overtopping has occurred subsequent to 1965. The dam is overgrown with brush.

c. Appurtenant Structures - The spillway is a trapezoidal channel located on the left abutment of the dam. There are no outlet works in the dam. The control section (entrance) to the spillway is well vegetated and has an accumulation of debris and sediment. The discharge channel is overgrown with thick brush.

d. Reservoir Area - The reservoir slopes are moderate and forested with no signs of instability. There are several islands located in the reservoir. There was no evidence that sedimentation is a significant problem in the reservoir.

e. Downstream Channel - The downstream channel is clogged with debris and vegetation. There are no damage centers between Romobe Lake Dam and Hathaway Pond Dam. Hathaway Lake is located 1400 feet downstream of Romobe Lake Dam. Hathaway Pond Dam (NDI No. PA 00050, PennDER No. 58-06) is located 3000 feet downstream of Romobe Lake Dam. Hathaway Pond Dam is a "Small" size - "Significant" hazard dam. In a Phase I Inspection Report currently being prepared by Michael Baker, Jr., Inc., Hathaway Pond Dam was analyzed for a spillway design flood (SDF) equal to the 100-year flood. During the SDF, Hathaway Pond Dam is overtopped by a maximum depth of 0.98 foot for a total duration of 4.0 hours. Failure of Romobe Lake Dam is likely to

have an effect on Hathaway Pond Dam and increase flooding in the damage center downstream, consisting of two houses, one trailer and a township road, located 1800 feet downstream of Hathaway Pond Dam.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal written instructions for lowering the reservoir or evacuating the downstream area in case of an impending failure of the dam. It is recommended that formal emergency procedures be adopted, prominently displayed, and furnished to all operating personnel.

4.2 MAINTENANCE OF DAM

There are no formal records of maintenance or formal procedures for evaluating the necessity of maintenance for the structure. It is recommended that formal inspection procedures be developed.

4.3 MAINTENANCE OF OPERATING FACILITIES

There were no operating facilities observed at the dam. An emergency drawdown plan should be developed in case there is need to draw down the reservoir.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

At the present time, there is no warning system or evacuation plan in operation. It is recommended that a formal emergency procedure be prepared.

4.5 EVALUATION OF OPERATIONAL ADEQUACY

A formal maintenance and operations manual, including drawdown provisions, should be prepared for the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data - No hydrologic or hydraulic design calculations are available for Romobe Lake Dam.

b. Experience Data - No information concerning the effects of significant floods on the dam is available.

c. Visual Observations - During the visual inspection, no problems were observed which would indicate that the dam and appurtenant facilities could not perform satisfactorily during a flood event.

There is a small pond upstream from Romobe Lake which is formed by a railroad embankment. This pond is not believed to have a significant effect on Romobe Lake.

d. Overtopping Potential - Romobe Lake Dam is a "Small" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF). Because the dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF.

Using material from "The Hydrologic Study - Tropical Storm Agnes", prepared by The Corps of Engineers in New York City, the peak inflow to the impoundment for the 100-year flood was calculated to be 955 c.f.s. The hydrologic characteristics of the basin, specifically, the Snyder's Unit Hydrograph parameters, were obtained from a regionalized analysis conducted by the Baltimore District of the U.S. Army Corps of Engineers. Using these parameters, a peak inflow of 905 c.f.s. was obtained for the 100-year flood. This peak flow is within 5 percent of the peak flow calculated; therefore, this hydrograph was used for the hydrologic analysis.

The hydraulic capacity of the dam, reservoir, and spillway was then assessed by utilizing the U.S. Army Corps of Engineers' Flood Hydrograph Package, HEC-1 DB.

Analysis of the dam and spillway shows that during the 100-year flood the dam will be overtopped by a maximum depth of 2.0 feet for a duration of 40.3 hours.

e. Spillway Adequacy - As outlined in the above analysis, the spillway will not pass the required SDF without overtopping the dam; therefore, the spillway is considered "Inadequate."

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - The dam shows evidence of being overtopped previously. The dam should be repaired and adequate spillway capacity provided.

b. Design and Construction Data - No design or construction data were available for review. The dam was originally constructed with a vertical downstream face. This was later revised with the addition of rockfill, forming a 2.4H:1V downstream slope. Because of the low height of the dam, history of satisfactory performance of the modest slopes, and because no signs of distress were observed, no further stability analysis is deemed necessary for this Phase I Inspection Report.

c. Operating Records - Nothing in the available operational information indicates concern relative to the structural stability of the dam.

d. Post-Construction Changes - The addition of rockfill against the vertical downstream face increased the stability of the dam. No other changes are known.

e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity; therefore, further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety - Romobe Lake Dam was found to be in poor overall condition at the time of inspection. Romobe Lake Dam is a "Significant" hazard - "Small" size dam requiring a spillway capacity in the range of the 100-year flood to the 1/2 PMF. Because Romobe Lake Dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF. As presented in Section 5, the spillway and reservoir are not capable of passing the 100-year flood without overtopping the dam. During the 100-year flood, the dam is overtopped by a maximum depth of 2.0 feet for a total duration of 40.3 hours. Therefore, the spillway is considered "Inadequate."

b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.

c. Urgency - The owner should immediately initiate the further evaluation discussed in paragraph 7.1.d.

d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner, under the guidance of a professional engineer, develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. Item 1 below should be completed by a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

1) Develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

2) Remove the debris and silt at the entrance to the spillway.

3) Repair the dam where overtopping has occurred.

4) Cut the brush on the dam.

5) Cut the brush in the spillway discharge channel.

6) Clear the debris and cut the brush in the channel immediately downstream of the dam.

7) Provide means to draw down the reservoir during an emergency.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH, TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List
Visual Inspection
Phase 1

Name of Dam Romobe Lake Dam County Susquehanna State PA **Coordinates** Lat. N 41°48.6'

NDI # PA 00051
PennDER # 58-10

Long. W 75°30.9'

Date of Inspection 1 November 1980 Weather Overcast, snow flurries Temperature 40° F.

Pool Elevation at Time of Inspection 1969.7 ft. M.S.L.* **Tailwater at Time of Inspection** 1962.3 ft. M.S.L.

*All elevations are referenced to the minimum top of dam, elevation 1970.0 ft. M.S.L., as estimated from the USGS 7.5 minute topographic quadrangle, Thompson, PA.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski
Wayne D. Lasch
Jeffrey S. Maze

Owner's Representatives:

James G. Ulinski Recorder

MASONRY DAMS

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	No problems observed.	
DRAINS	None	
WATER PASSAGES	None	
FOUNDATION	No problem observed.	

MASONRY DAMS

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not applicable	
STRUCTURAL CRACKING	Not applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	The dam shows evidence of having been overtopped previously. This overtopping must have occurred since the last inspection photographs were taken (1965).	The dam should be repaired and an adequate spillway provided.
MONOLITH JOINTS	Not applicable	
CONSTRUCTION JOINTS	Not applicable	
VEGETATION	The dam is overgrown with brush.	Cut the brush.

EMBANKMENT - Not Applicable

Name of Dam ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS		
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE		
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES		

EMBANKMENT - Not Applicable

Name of Dam ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		
RIPRAP FAILURES		

EMBANKMENT - Not Applicable

Name of Dam ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
ANY NOTICEABLE SEEPAGE		
STAFF GAGE AND RECORDER		
DRAINS		

OUTLET WORKS - Not Applicable

Name of Dam: ROMOBE LAKE DAM
NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT		
INTAKE STRUCTURE		
OUTLET STRUCTURE		
OUTLET CHANNEL		
EMERGENCY GATE		

UNGATED SPILLWAY

Name of Dam: ROMOBE LAKE DAM
NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTION	The control section is well vegetated. Debris and an accumulation of sediment has been deposited at the entrance (control section) of the channel.	Remove the debris and sediment.
APPROACH CHANNEL	The reservoir forms the approach channel.	
DISCHARGE CHANNEL	The discharge channel is overgrown with thick brush.	Cut the brush.
BRIDGE AND PIERS	None	

GATED SPILLWAY - Not Applicable

Name of Dam: ROMOBE LAKE DAM
NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

INSTRUMENTATION

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

RESERVOIR

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

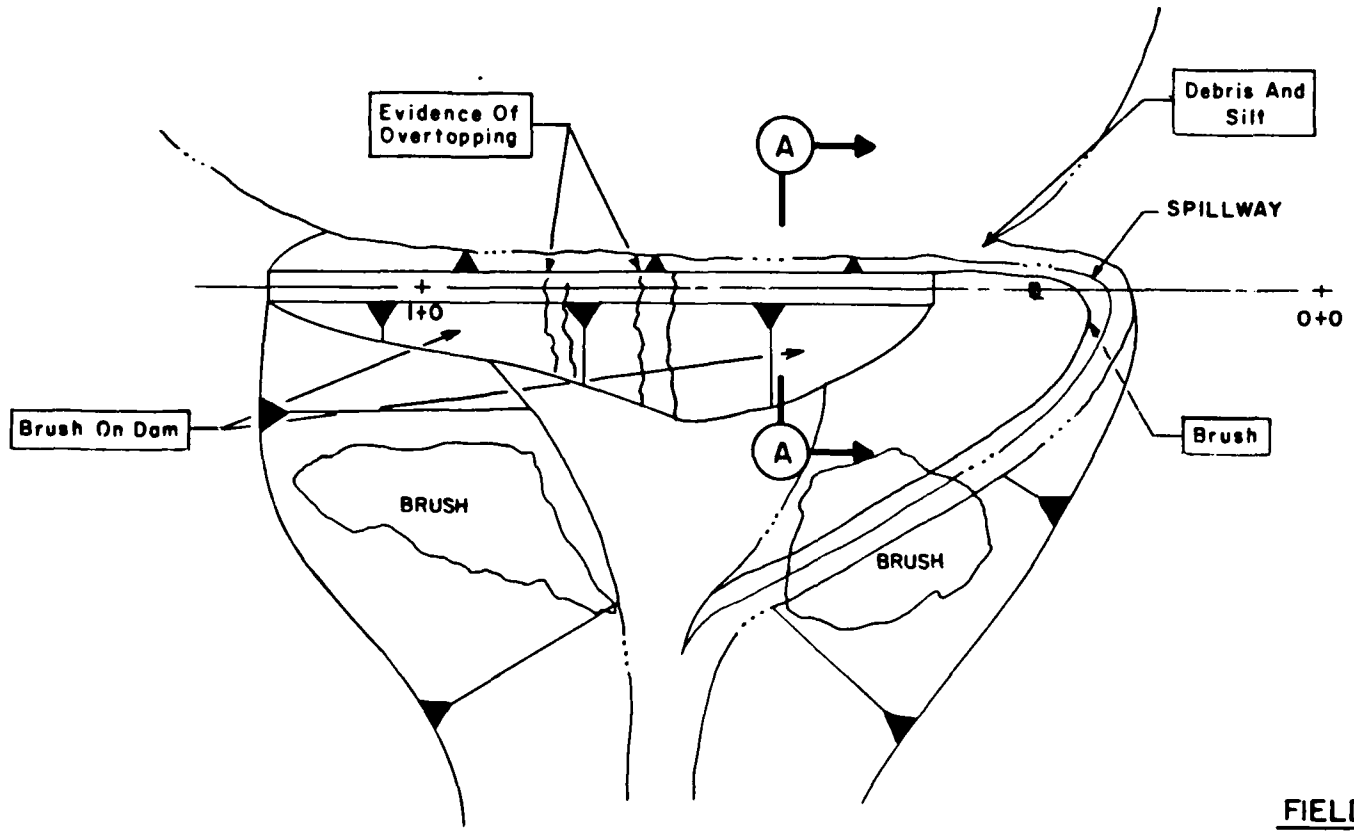
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are moderate (5°-15°) and forested.	
SEDIMENTATION	There is no evidence that sedimentation is a significant problem in the reservoir.	

DOWNSTREAM CHANNEL

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is obstructed with debris and vegetation.	Clear the debris and vegetation.
SLOPES	The downstream channel has a slope of approximately 1% to 2% to Hathaway Pond.	
APPROXIMATE NO. OF HOMES AND POPULATION	There are no damage areas between Romobe Lake Dam and Hathaway Pond Dam. Hathaway Lake is located 1400 ft. downstream of Romobe Lake Dam. Hathaway Pond Dam (NDI # PA 00050, PennDER # 58-06) is located 3000 ft. downstream of Romobe Lake Dam. Failure of Romobe Lake Dam is likely to have an effect on Hathaway Pond Dam and the damage center of two houses, a trailer, and a township road, located 1800 ft. downstream of Hathaway Pond Dam. Michael Baker, Jr., Inc., is currently preparing a Phase I Inspection Report on Hathaway Pond Dam.	



FIELD SKETCH
ROMOBE LAKE DAM
NDI NO.PA00051
Penn DER NO.58-10
SCHEMATIC- NOT TO SCALE

CROSS SECTION TAKEN AT STA. 0+60

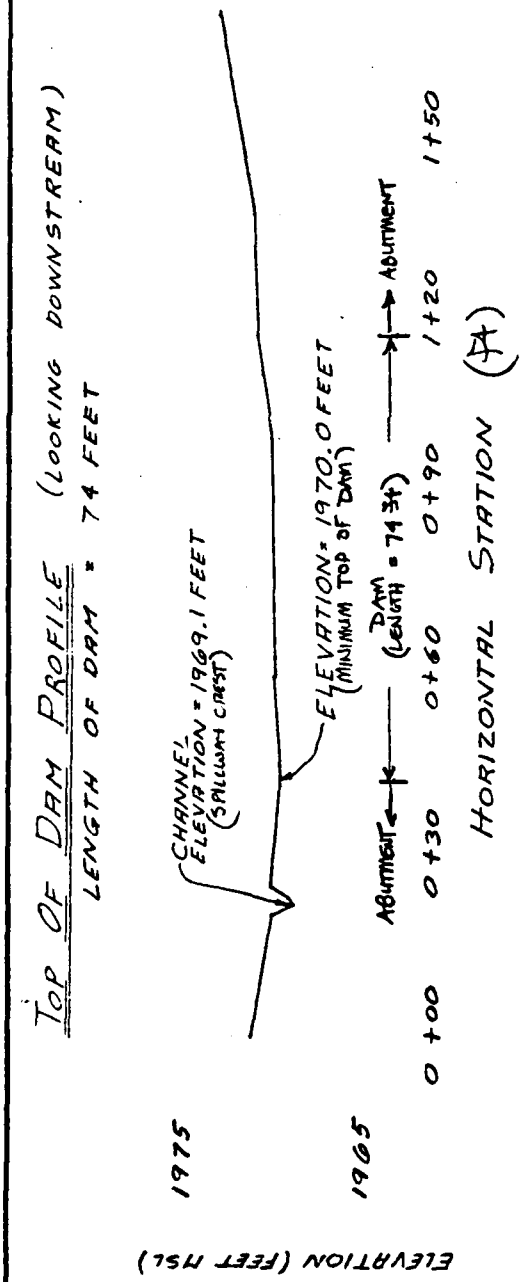
MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

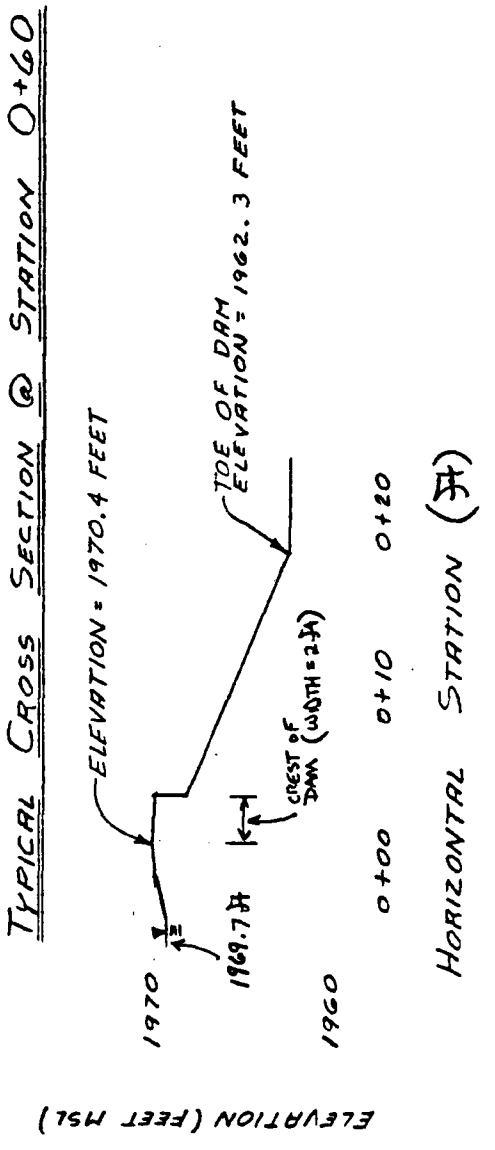
Box 280
Beaver, Pa. 15009

ROMOBE LAKE DAM

TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

DATE OF INSPECTION: 1 November 1980





APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: ROMOBE LAKE DAM
NDI # PA 00051

ITEM	REMARKS
PLAN OF DAM	No information available. See Field Sketch (Plate 3) of this report for a general plan of the dam.
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle of Thompson, Pennsylvania, was used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1).
CONSTRUCTION HISTORY	The original design, builder and date of construction are unknown. The dam was strengthened around 1920 by building up the vertical downstream face with stones, as requested by the Water Supply Commission of Pennsylvania.
TYPICAL SECTIONS OF DAM	None available
HYDROLOGIC/HYDRAULIC DATA	No information available.
OUTLETS - PLAN	No information available.
- DETAILS	No information available.
- CONSTRAINTS	No information available.
- DISCHARGE RATINGS	No information available.
RAINFALL/RESERVOIR RECORDS	None available

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	No geology reports are available for the dam. See Appendix F for the Regional Geology.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No design computations are available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available
POST-CONSTRUCTION SURVEYS OF DAM	None performed.
BORROW SOURCES	No information available.

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	The dam was stregthened around 1919 by placing rocks on the downstream side of the embankment.
HIGH POOL RECORDS	No information available.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	The latest recorded inspection by PennDER, conducted on 4 August 1965, found the dam to be in good condition. The Water Supply Commission conducted inspections on 20 May 1920, 17 May 1919 and 30 July 1917. These inspection reports are available in the PennDER File No. 58-10.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported in the information available.
MAINTENANCE OPERATION RECORDS	No formal maintenance records are kept.

Name of Dam: ROMOBE LAKE DAM

NDI # PA 00051

ITEM	REMARKS
SPILLWAY PLAN,	
SECTIONS and DETAILS	No information available.
OPERATING EQUIPMENT PLANS & DETAILS	There is no operating equipment.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.98 sq.mi. (primarily forests and pastures)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1969.1 ft. M.S.L. (162 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1970.0 ft. M.S.L. (195 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1970.0 ft. M.S.L. (minimum top of dam elevation)

SPILLWAY: Trapezoidal earth channel.

a. Crest Elevation 1969.1 ft. M.S.L.
b. Type Trapezoidal channel
c. Bottom Width 1 ft.
d. Top Width 5 ft.
e. Location Spillover Left abutment
f. Number and Type of Gates None

OUTLET WORKS: None

a. Type
b. Location
c. Entrance Inverts
d. Exit Inverts
e. Emergency Drawdown Facilities

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam

Top Photo (OV-T) - Overall View of Upstream Face of Dam (Looking Downstream)

Bottom Photo (OV-B) - Overall View of Downstream Face of Dam from Left Abutment

Photograph Location Plan

Photo 1 - View of Upstream Face of Dam from Left Abutment

Photo 2 - View of Downstream Face of Dam (Looking Upstream)

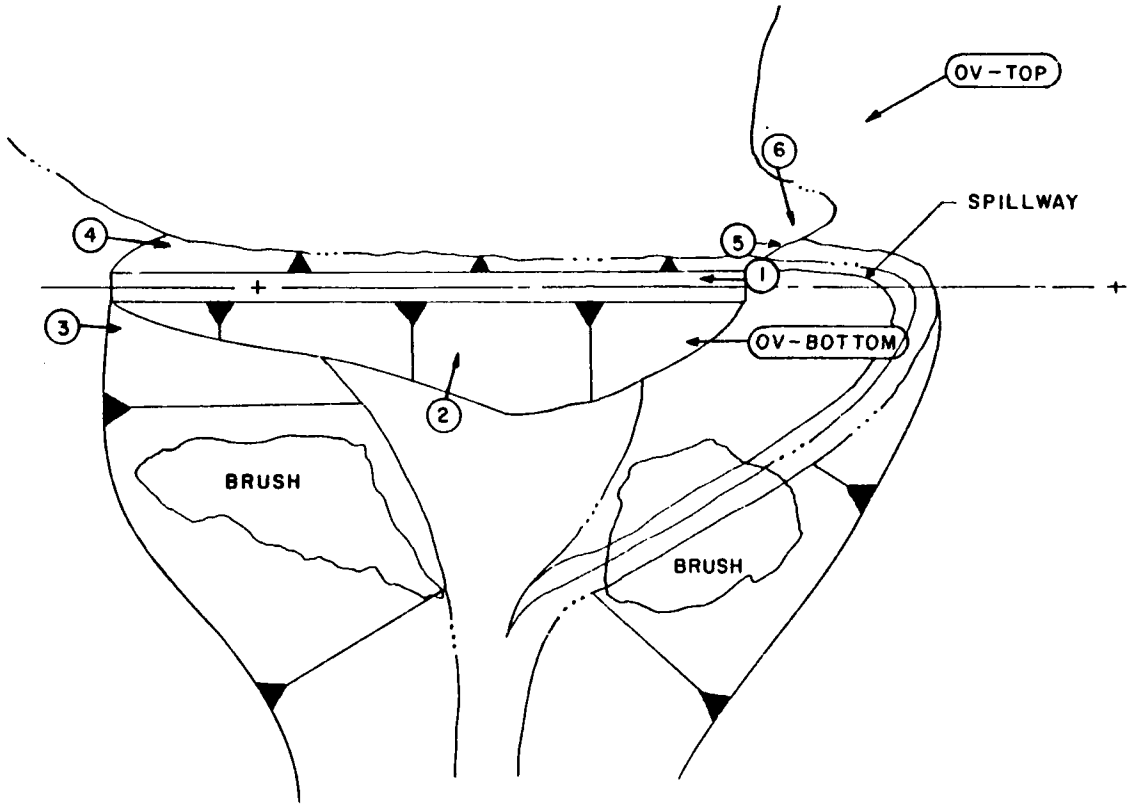
Photo 3 - View of Downstream Face of Dam from Right Abutment

Photo 4 - View of Upstream Face of Dam from Right Abutment (Note: Spillway Channel Located to Left of Fence in Upper Left Portion of Photograph)

Photo 5 - View of Spillway Channel Entrance and Crest

Photo 6 - View of Spillway Channel (Looking Downstream)

Note: Photographs were taken on 1 November 1980.



PHOTOGRAPH LOCATION PLAN

ROMOBE LAKE DAM

NDI NO. PA00051
PennDER NO. 58-10
Photographs Taken 1 November 1980

ROMOBE LAKE DAM

PHOTO 1. View of Upstream Face of Dam from Left Abutment

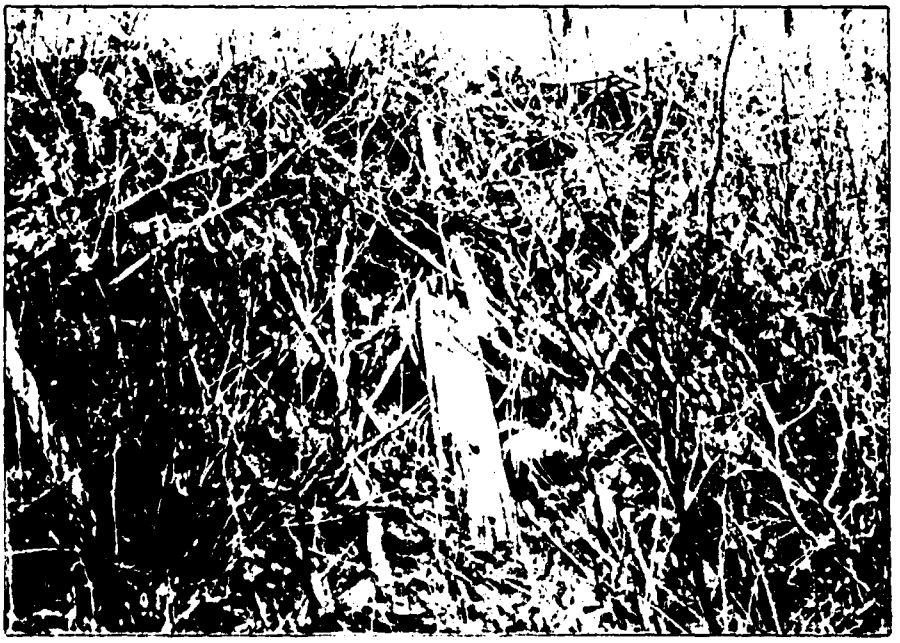


PHOTO 2. View of Downstream Face of Dam (Looking Upstream)

PHOTO 3. View of Downstream Face of Dam from Right Abutment

PHOTO 4. View of Upstream Face of Dam from Right Abutment
(Note: Spillway Channel Located to Left of Fence in Upper Left Portion of Photograph)

PHOTO 5. View of Spillway Channel Entrance and Crest

PHOTO 6. View of Spillway Channel (Looking Downstream)

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject ROMOCE LAKE DAM S.O. No. _____

APPENDIX D - HYDROLOGIC AND Sheet No. _____ of _____

HYDRAULIC CALCULATIONS Drawing No. _____

Computed by _____ Checked by _____ Date _____

SUBJECT	PAGE

PREFACE

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed, however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: ROMOBE LAKE DAM

100-YEAR STORM = 6.4 INCHES/24 HOURS[1]

STATION	1	2	3	4	5
Station Description	ROMOBE LAKE DAM				
Drainage Area (square miles)	0.98				
Cumulative Drainage Area (square miles)	0.98				
Adjustment of PMF for Drainage Area (%)[1] 6 Hours 12 Hours 24 Hours 48 Hours 72 Hours	100-YEAR STORM DISTRIBUTION ON SHEET 6				
Snyder Hydrograph Parameters					
Zone [3]	11				
C_p/C_t [4]	0.62/1.50				
L (miles) [5]	1.70				
L_{ca} (miles)[5]	0.89				
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	1.70				
Spillway Data Crest Length (ft) Freeboard (ft) Discharge Coefficient Exponent	SPILLWAY DISCHARGE RATING DEVELOPED ON SHEET 5				

[1] Technical Paper No. 40, Cooperative Studies Section, U.S. Weather Bureau, Washington, D.C., 1961.

[2] Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's coefficients (C_p and C_t).

[3] Snyder's Coefficients.

[4] L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

Subject PONDAGE LAKE DAM S.O. No.
HYDRAULIC DATA Sheet No. 2 of 12
Drawing No.
Computed by GWT Checked by WDL Date 12/24/80

STORAGE CALCULATIONS

AREA VS. ELEVATION DATA (MEASURED FROM QUADS)

ELEVATION (FT)	SURFACE AREA (ACRES)
1969.1	35.55
1980	51.34
2000	132.31

NORMAL POOL STORAGE

STORAGE VOLUME = $V_{NP} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$

h = ESTIMATED AVERAGE DEPTH = 4.9 FT.

A_1 = SURFACE AREA OF NORMAL POOL = 35.55 Ac.

A_2 = SURFACE AREA OF RESERVOIR BOTTOM = 30.67 Ac.
(ESTIMATED FROM AVERAGE DEPTH AND RESERVOIR SIDE SLOPE)

NORMAL POOL STORAGE = $V_{NP} = \frac{4.9}{3}(35.55 + 30.67 + \sqrt{(35.55)(30.67)})$

$V_{NP} = 162.09$ Ac.-Ft.

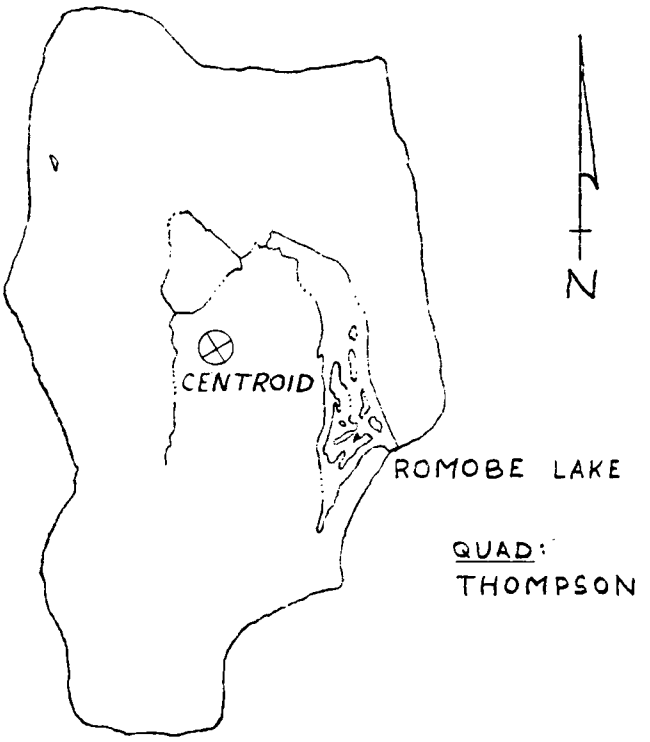
TOP OF DAM STORAGE

195 Ac.-Ft. (FROM HEC-1 ANALYSIS)

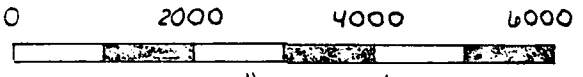
SNYDER'S UNIT HYDROGRAPH PARAMETERS

$L = 1.70$ Mi., $L_{CA} = 0.89$ Mi.
WATERSHED IS IN ZONE 11
$C_p = 0.62$, $C_t = 1.50$
$t_p = 1.50 (L \times L_{CA})^{0.3} = 1.70$ HR.

DRAINAGE AREA ABOVE DAM - 0.98 Sq. Mi.



ROMOBE LAKE DAM:
DRAINAGE AREA AND
CENTROID MAP



SCALE: 1" = 2000'

MICHAEL BAKER, JR., INC.
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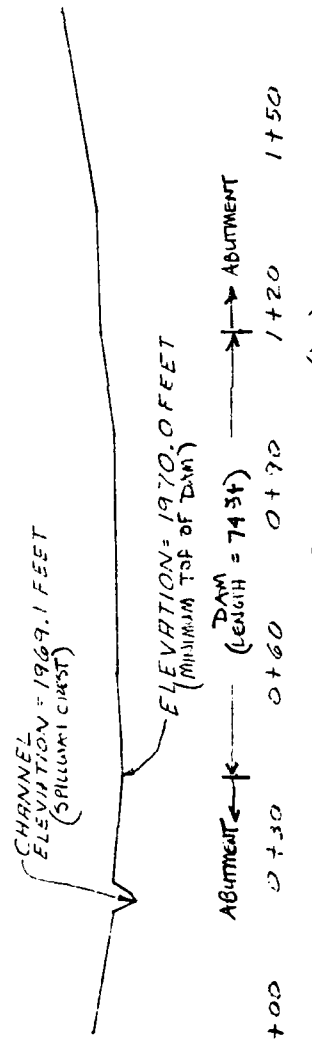
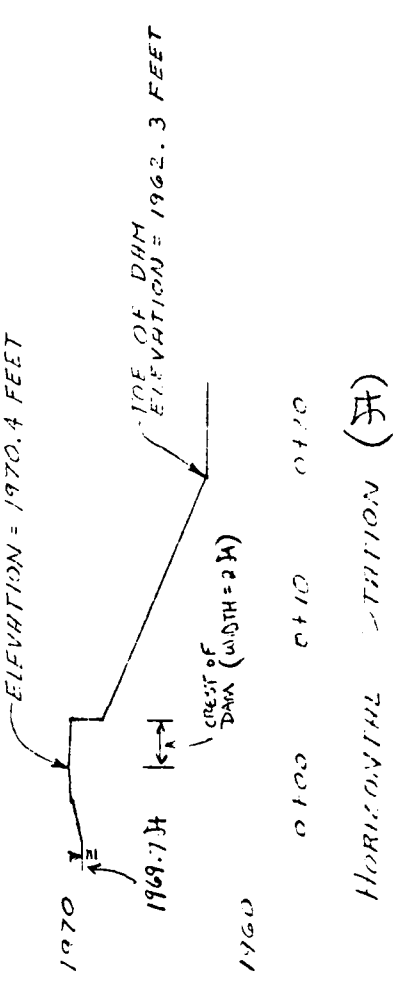
Subject ROOBE LAKE DAM S.O. No. [illegible]
TOP OF DAM PROFILE Sheet No. 4 of 12
TYPICAL CROSS SECTION Drawing No.
Computed by EUST Checked by WLL Date 11-19-82

TOP OF DAM PROFILE (LOOKING DOWNSTREAM)
LENGTH OF DAM = 74 FEET



TYPICAL CROSS SECTION @ STATION 0+60



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THE BAKER ENGINEERS
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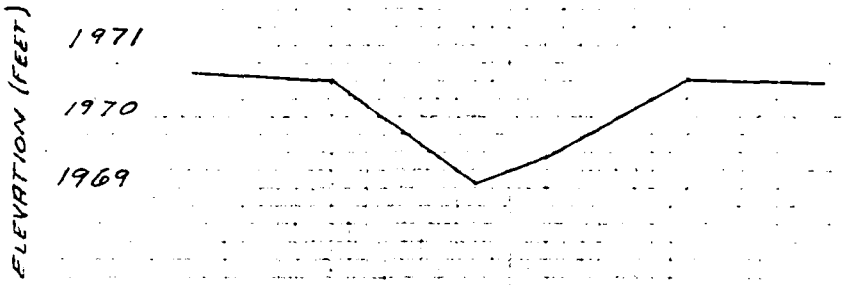
Beaver, Pa. 15009

Subject ROMOBE LAKE DAM — S.O. No.:
SPILLWAY CROSS SECTION — Sheet No. 5 of 12
AND DISCHARGE RATING — Drawing No.:
Computed by GWT — Checked by WDC — Date 1-30

SPILLWAY CROSS SECTION



SPILLWAY DISCHARGE RATING

DEVELOPE RATING CURVE BASED UPON CRITICAL FLOW OVER SPILLWAY:

$V = \sqrt{gD}$ (CHOW, OPEN CHANNEL HYDRAULICS, P. 43)

D = MEAN HYDRAULIC DEPTH = $\frac{\text{FLOW AREA}}{\text{FREE SURFACE TOP WIDTH}} = \frac{A}{T}$

g = 32.2 FT/SEC²

V = MEAN FLOW VELOCITY

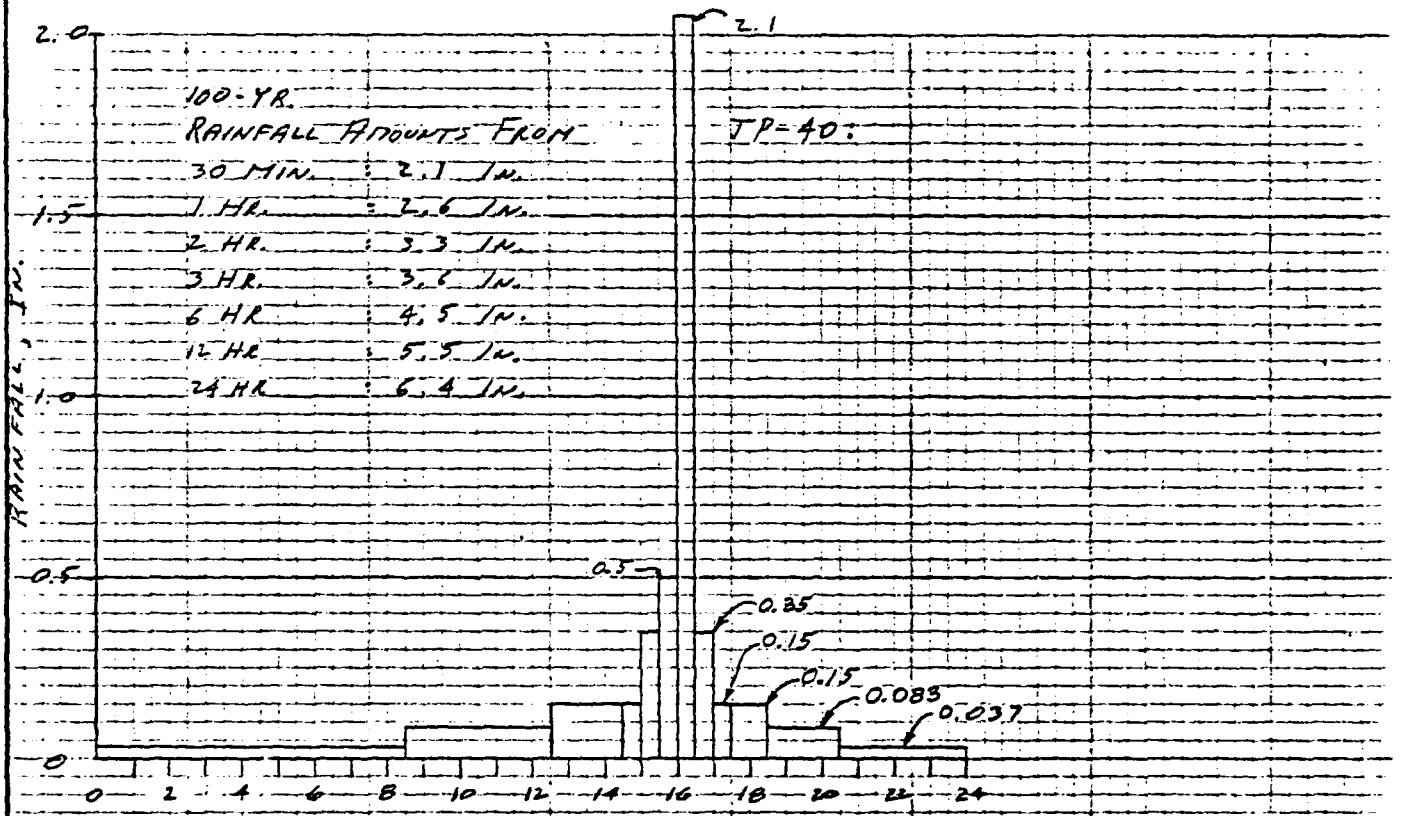
Q = AV

SPILLWAY ELEV., FT	FLOW DEPTH, FT.	AREA FT²	TOP WIDTH, FT.	A/T	V, FT/SEC.	Q, CFS	V²/2g	RESERVOIR SURFACE, FT.
1969.1	0	0	0	0	0	0	0	1969.1
1969.4	0.3	0.23	1.5	0.15	2.20	0.51	.07	1969.47
1970.0	0.9	1.69	3.4	0.50	4.01	6.78	.25	1970.25
1970.5	1.4	3.79	5.0	0.76	4.95	18.76	.38	1970.88
1971.0	1.9	6.29	5.0	1.26	6.37	40.07	.63	1971.63
1971.5	2.4	8.79	5.0	1.76	7.53	66.19	.88	1972.38
1972.0	2.9	11.29	5.0	2.26	8.53	96.30	1.13	1973.13

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject ROMOBE LAKE DAM S.O. No.
100-YEAR STORM DISTRIBUTION Sheet No. 6 of 12
Drawing No.
Computed by GWT Checked by WDL Date 11-25-80



RAINFALL DISTRIBUTION:
(30 MINUTE INTERVALS)

INTERVAL NUMBERS	% TOTAL RF OCCURING IN EACH INTERVAL
1-17	0.6
18-25	1.3
26-29	2.3
30	2.3
31	5.4
32	7.8
33	32.8
34	5.4
35	2.3
36-37	2.4
38-41	1.3
42-48	0.6

TOTAL = 100 %

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Subject ROMBRE LAKE DAM S.O. No.
100-YEAR DISCHARGE Sheet No. 7 of 12
CALCULATION Drawing No.
Computed by GWT Checked by WDL Date 12-23-80

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY - TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY.

DRAINAGE AREA - 0.98 Sq. Mi.

① COMPUTE THE MEAN LOGARITHM

$LOG(Q_m) = C_m + 0.75(LOG\ A)$

$LOG(Q_m)$ = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS.
A = DRAINAGE AREA, Sq. Mi. = 0.98 Sq. Mi.
C_m = MAP COEFFICIENT FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 = 2.15

$LOG(Q_m) = 2.15 + 0.75(LOG\ 0.98)$
$= 2.1434$

② COMPUTE STANDARD DEVIATION

$S = C_s - 0.05(LOG\ A)$

S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS.
C_s = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = 0.341
A = DRAINAGE AREA, Sq. Mi. = 0.98 Sq. Mi.

$S = 0.341 - 0.05(LOG\ 0.98)$
$= 0.3414$

③ SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.16

④ $LOG(Q_{100}) = LOG(Q_m) + K(P,g)S$

K(P,g) = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTAGE (P) AND SKEW COEFFICIENT (g) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY" = 2.45

$LOG(Q_{100}) = 2.1434 + 2.45(0.3414)$
$= 2.9798$

$Q_{100} = 954.6$ CFS

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1973
  LAST MODIFICATION  26 FEB 79
  MOD UPDATE         04 JUN 79    100-YEAR Flood Routing
**********
    1              A1       NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
    2              A2       HYDROLOGIC AND HYDRAULIC ANALYSIS OF ROMOBE LAKE DAM
    3              A3       UNIT HYDROGRAPH BY SNYDERS METHOD
    4              B    300       0      20       0       0       0       0       0      -4       0
    5              B1     5
    6              J      1       1       1
    7              J1     1
    8              K      1       1                                       1
    9              K1       RUNOFF HYDROGRAPH TO ROMOBE LAKE
   10              M      0       1    0.98
   11              U     43     6.4
   12              QI 0.005   0.006   0.006   0.006   0.006   0.006   0.006   0.006   0.006   0.006
   13              QI 0.006   0.006   0.006   0.006   0.006   0.006   0.006   0.013   0.013   0.013
   14              QI 0.013   0.013   0.013   0.013   0.013   0.023   0.023   0.023   0.023   0.023
   15              QI 0.054   0.078   0.328   0.054   0.023   0.024   0.024   0.013   0.013   0.013
   16              QI 0.013   0.006   0.006   0.006   0.006   0.006   0.006   0.006
   17              I
   18              M    1.73    0.62
   19              X   -1.5    -0.05    2.0
   20              K      1       2                                       1
   21              K1       ROUTING FOR ROMOBE LAKE DAM
   22              Y                                       1       1
   23              Y1     1                                                -1969.1      -1
   24              Y4 1969.1  1969.5  1970.2  1970.9  1971.6  1972.4  1973.1
   25              Y5     0     0.3     6.8    18.8    40.1    66.2    96.3
   26              $A 30.07   35.55   51.34  132.31
   27              $E 1954.2  1969.1    1980    2030
   28              $$ 1969.1
   29              $D  1970    3.08     1.5      69
   30              $L     0      75      96     135     150     159
   31              $V  1970     1970    1971  1971.5    1972  1972.5
   32              K     99
```

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MOD UPDATE         04 JUN 79
**********

RUN  DATE 04/15/81
     TIME   16.37
```

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
HYDROLOGIC AND HYDRAULIC ANALYSIS OF RUMUBE LAKE DAM
UNIT HYDROGRAPH BY SNYDERS METHOD

JOB SPECIFICATION

NQ	NDR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	20	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	ITRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF HYDROGRAPH TO RUMUBE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	1	0.98	0.0	0.98	0.0	0.0	0	0	0

LOSS DATA

LRUPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	0.0	0.0	0.0	0.0

UNIT HYDROGRAPH DATA
TP= 1.70 CP=0.62 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 28 END-OF-PERIOD ORDINATES, LAG= 1.69 HOURS, CP= 0.62 VOL= 1.00

18.	55.	129.	184.	227.	232.	203.	163.	131.	106.
85.	68.	55.	44.	35.	29.	23.	18.	15.	12.
10.	8.	6.	5.	4.	3.	3.	2.		

0
END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									304	0.40	0.40	0.0	12566.

```
1 163.11 163.11  0.11  335.031

**********          **********          **********          **********          **********

                                   HYDROGRAPH ROUTING

                     ROUTING FOR RUMUBE LAKE DAM

                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              2       1       0       0       0       0       1       0       0
                                                  ROUTING DATA
                    QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                      0.0     0.0     0.0       1       1       0       0               0

                          NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                              1       0       0     0.0     0.0     0.0  -1969.      -1

       STAGE     1969.10    1969.50    1970.20    1970.90    1971.60    1972.40    1973.10

        FLOW         0.0       0.30       6.80      18.80      40.10      66.20      96.30

    SURFACE AREA=       31.       36.       51.      132.

        CAPACITY=        0.      162.      633.     2407.

       ELEVATION=     1964.     1969.     1980.     2000.

                          CREL   SPWID    COQW    EXPW   ELEVL    COQL   CAREA    EXPL
                        1969.1     0.0     0.0     0.0     0.0     0.0     0.0     0.0

                                                   DAM DATA
                                          TOPEL    COQD    EXPD  DAMWID
                                         1970.0     3.1     1.5     69.

       CREST LENGTH        0.       75.       96.      135.      150.      159.
       AT OR BELOW
       ELEVATION       1970.0    1970.5    1971.0    1971.5    1972.0    1972.5

   PEAK OUTFLOW IS      746. AT TIME  13.00 HOURS


**********          **********          **********          **********          **********
```

SHEET 10 of 12

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00
HYDROGRAPH AT	1	0.98	1	864.
		(2.54)		(24.48)(
ROUTED TO	2	0.98	1	746.
		(2.54)		(21.12)(

SHEET 11 OF 12

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1969.10	1969.10	1970.00
STORAGE	162.	162.	195.
OUTFLOW	0.	0.	0.

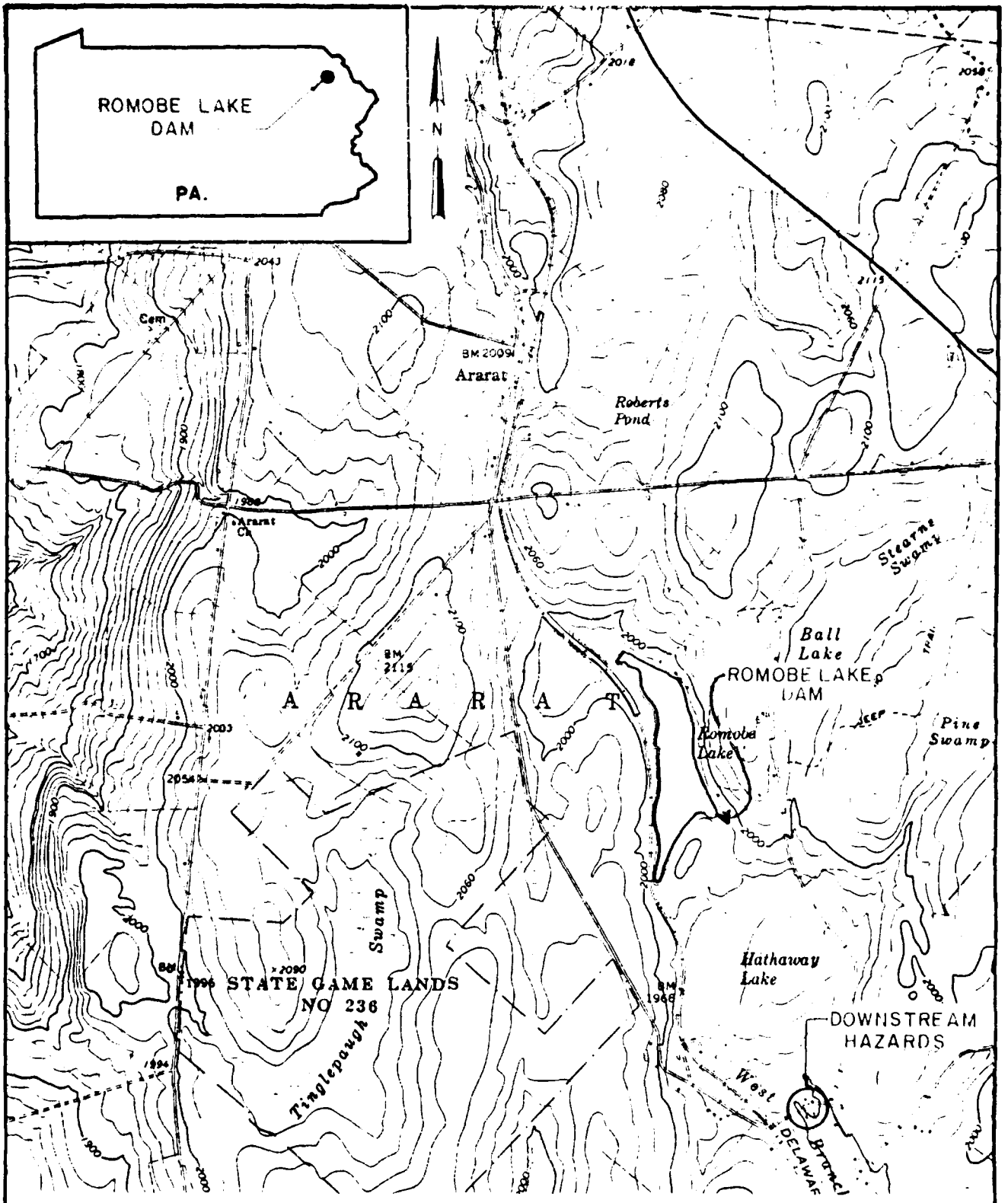
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1971.98	1.98	270.	746.	40.33	13.00	0.0

100-YEAR FLOOD ROUTING

APPENDIX E

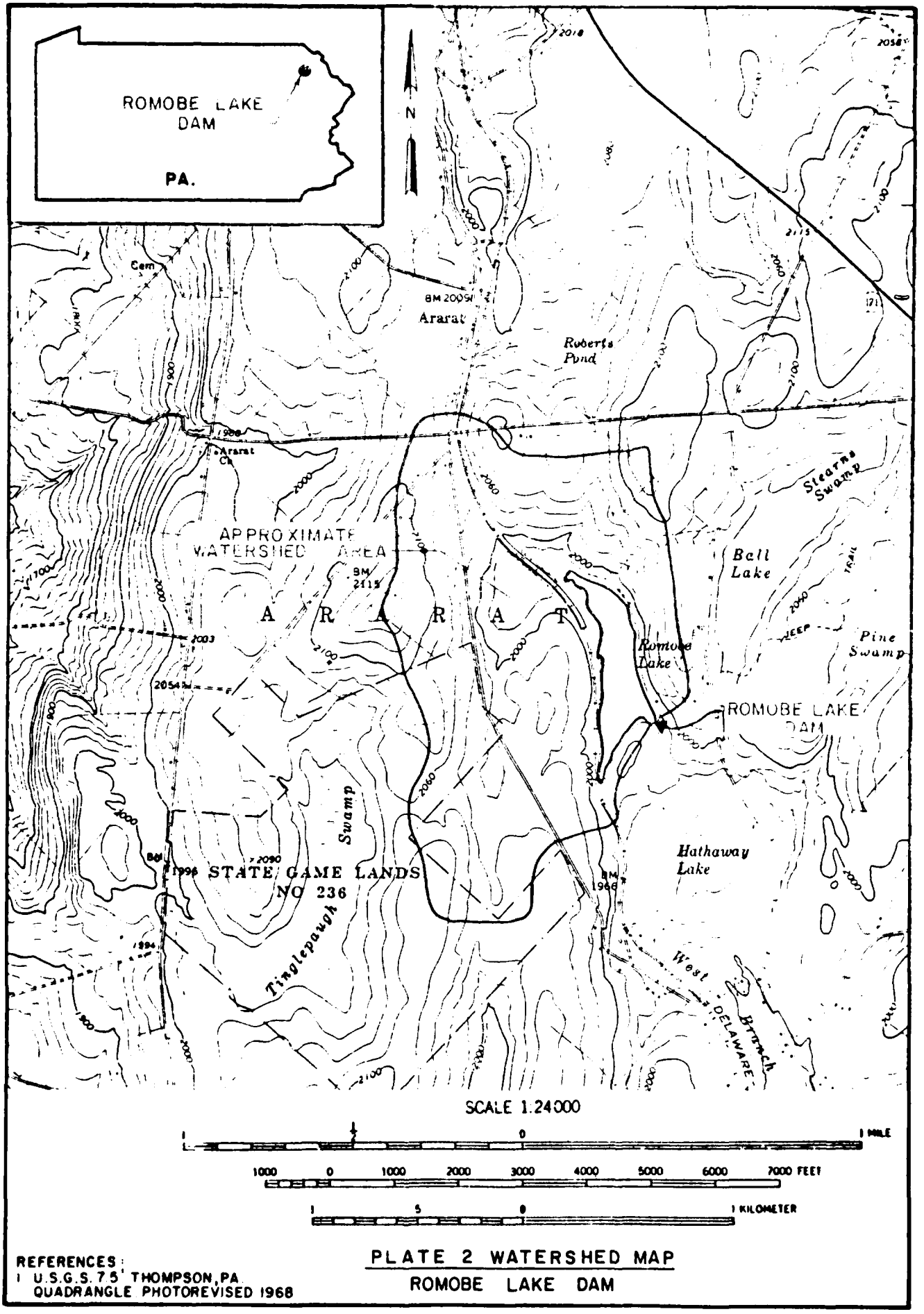
PLATES

CONTENTS



REFERENCES:
1. U.S.G.S. 7.5' THOMPSON, PA. QUADRANGLE PHOTOREVISED 1968

PLATE 1 LOCATION PLAN
ROMOBE LAKE DAM



REFERENCES:
1 U.S.G.S. 7.5' THOMPSON, PA. QUADRANGLE PHOTOREVISED 1968

PLATE 2 WATERSHED MAP

ROMOBE LAKE DAM

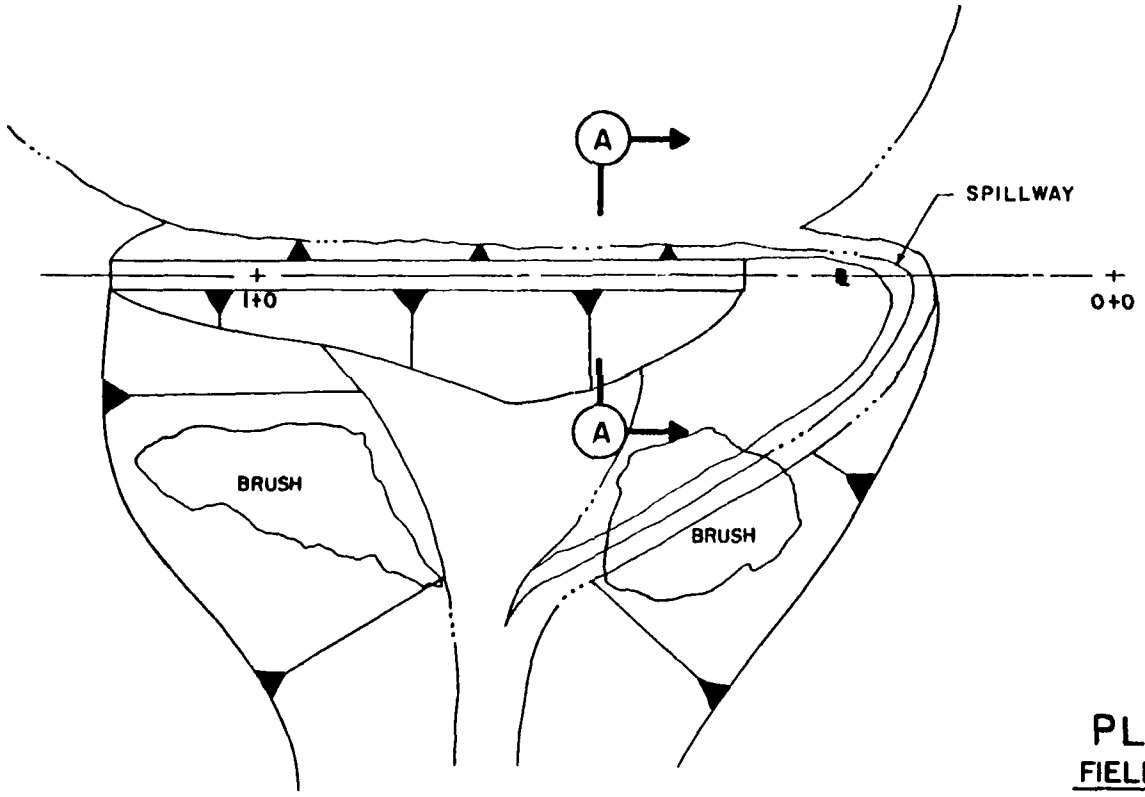


PLATE 3

FIELD SKETCH

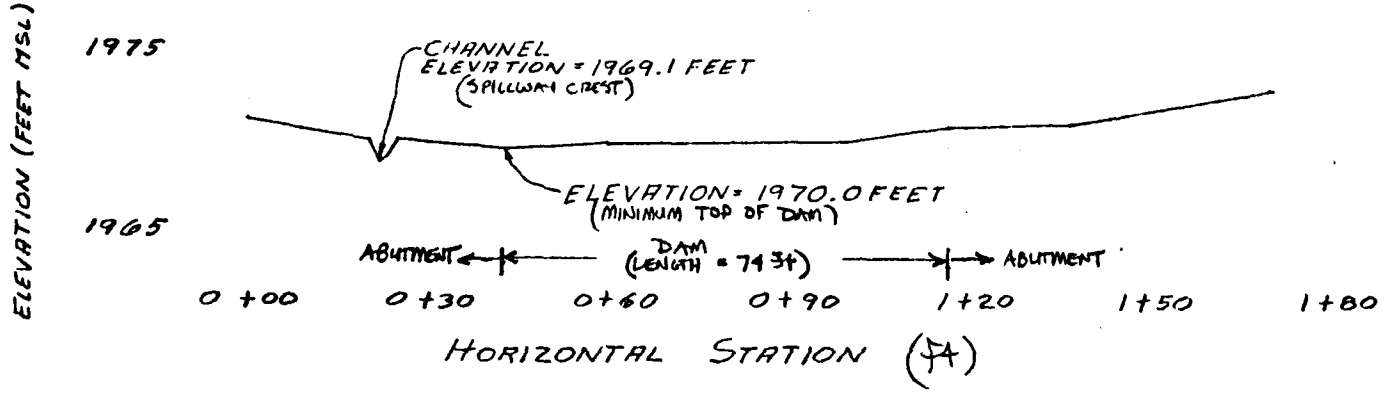
ROMOBE LAKE DAM
NDI NO. PA00051
Penn DER NO. 58-10
SCHEMATIC - NOT TO SCALE

CROSS SECTION TAKEN AT STA. 0+60

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

TOP OF DAM PROFILE (LOOKING DOWNSTREAM)

LENGTH OF DAM = 74 FEET



TYPICAL CROSS SECTION @ STATION 0+60

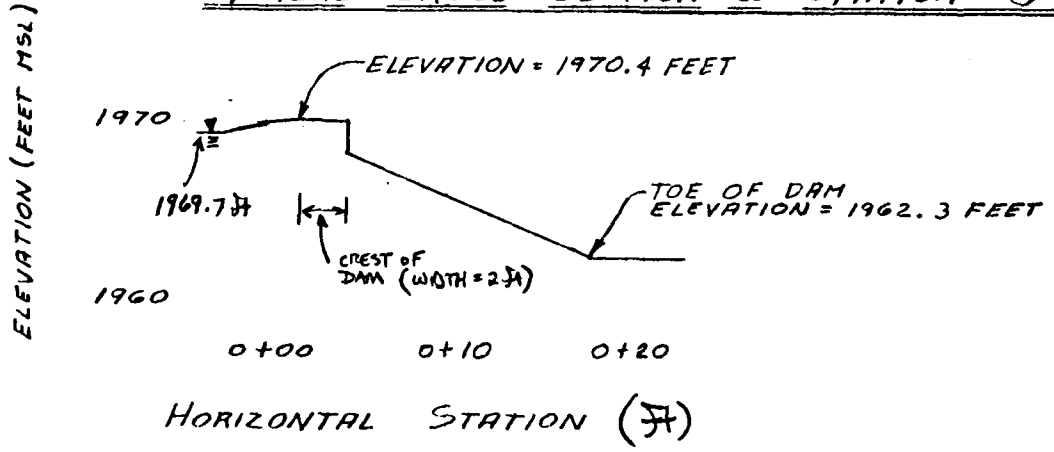


PLATE 4

APPENDIX F

REGIONAL GEOLOGY

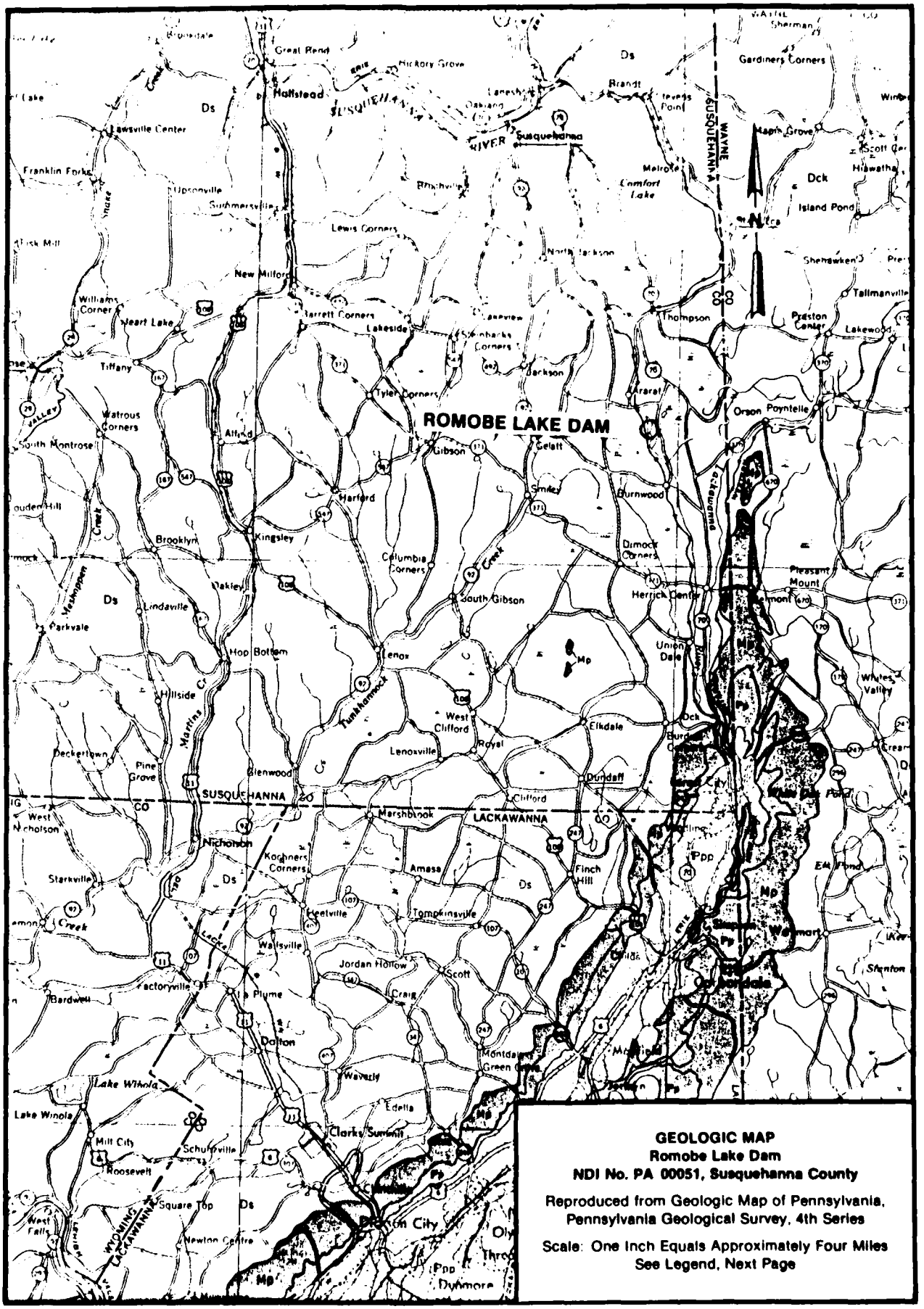
Romobe Lake Dam
NDI No. PA 00051, PennDER No. 58-10

REGIONAL GEOLOGY

Romobe Lake Dam is located in the Glaciated Low Plateaus section of the Appalachian Plateaus physiographic province. The area is drained to the south by the Lackawanna River and shows a maximum relief of approximately 100 feet. The impoundment sits on a plateau approximately 900 feet above the Tunkhannock Creek valley which lies 3 miles west of the dam.

The area has been glaciated at least three times and is presently covered with Wisconsin Stage deposits. According to the Soil Conservation Service's Soil Survey for Susquehanna County, the soils derived from this till consist of channery silt loams of the Volusia associaton. The soil has a unified classification of ML in the vicinity of the dam. No test boring data were available for review; thus, the thickness of overburden is difficult to ascertain.

Geologic references indicate that the bedrock underlying the dam consists of members of the Catskill formation in the Susquehanna Group. The Catskill is composed of bay and prodelta, red and gray shales and sandstones of Upper Devonian age but may contain scattered, thin coal seams and scattered fish remains. The strata remains essentially horizontal after the Appalachian Uplift.



GEOLOGIC MAP
Romobe Lake Dam
NDI No. PA 00051, Susquehanna County

Reproduced from Geologic Map of Pennsylvania, Pennsylvania Geological Survey, 4th Series

Scale: One Inch Equals Approximately Four Miles
See Legend, Next Page

GEOLOGY MAP LEGEND

DEVONIAN

UPPER

WESTERN PENNSYLVANIA

Oswayo Formation
Greenish gray to gray shales, siltstones and sandstones becoming increasingly shaly westward, considered equivalent to type Oswayo. Riceville Formation Dr in Erie and Crawford Counties, probably not distinguishable north of Corry.

Dcr

Cattaraugus Formation
Red, gray and brown shale and sandstone with the proportion of red decreasing westward, includes Venango sands of drillers and Salamanca sandstone and conglomerate, some limestone in Crawford and Erie counties.

Conneaut Group
Alternating gray, brown, greenish and purplish shales and siltstones; includes "pink rock" of drillers and "Chemung" and "Girard" Formations of northwestern Pennsylvania.

Dcn

Canadaway Formation
Alternating brown shales and sandstones; includes "Portage" Formation of northwestern Pennsylvania.

CENTRAL AND EASTERN PENNSYLVANIA

Oswayo Formation
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous eastward. Relation to type Oswayo not proved.

Dck

Catskill Formation
Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

Dm

Marine beds
Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Ds

Susquehanna Group
Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports; barbs on "Chemung" side of line.

MIDDLE AND LOWER

Dh

Hamilton Group

Mahantango Formation
Brown to olive shale with interbedded sandstones which are dominant in places (Montebello), highly fossiliferous in upper part; contains "Centerfield coral bed" in eastern Pennsylvania.

Marcellus Formation
Black, fissile, carbonaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.

Onondaga Formation
Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places, includes Selinsgrove Limestone and Needmore Shale in central Pennsylvania and Buttermilk Falls Limestone and Esopus Shale in easternmost Pennsylvania; in Lehigh Gap area includes Palmerton Sandstone and Bowmanstown Chert

Dmo

Oriskany Formation
White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Ridgely) at the top, dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver)

Helderberg Formation
Dark gray, calcareous, thin bedded shale (Mandata) at the top equivalent to Port Ewen Shale and Rickett Limestone in the east, dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle, and, at the base, dark gray, medium to thick bedded, crystalline limestone (Coeymans), sandy and shaly in places with some chert nodules.